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XILINX, INC
ATTN: LEGAL DEPARTMENT
2100 LOGIC DR
SAN JOSE, CA 95124

EXAMINER
WONG, LUT

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

	Application No.	Applicant(s)
Office Action Summary	10/644,162	TRIMBERGER, STEPHEN M.
	Examiner	Art Unit
	LUT WONG	2129

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _15 October 2009_.

2a)☒ This action is **FINAL**.   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-23, 25 and 27-33_ is/are pending in the application.

  4a) Of the above claim(s) _21-23_ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-20, 25 and 27-33_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

  Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

  Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

  a)☐ All   b)☐ Some * c)☐ None of:

    1.☐ Certified copies of the priority documents have been received.

    2.☐ Certified copies of the priority documents have been received in Application No. _____.

    3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

  * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
   Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
   Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

This office action is responsive to a Response to Restriction filed 1-15-2009 and

an AMENDMENT entered 7-14-2009 for the patent application 10/644162.

Compact Prosecution

It appears that this application would be better handled with an interview, in

person or over the phone. The examiner believes during an interview the applicant can

better explain what they believe the point of novelty is. Also, it would be much more

productive than via paper. The applicant is advised to request an interview at their

earliest convienence.

Status of Claims

Claims 1-23, 25, 27-33 are pending. Claims 24, 26 are cancelled. Claims 1 and

21 have been amended in the reply of 7-14-2009.

Claims 21-23 are withdrawn from further consideration pursuant to 37 CFR

1.142(b), as being drawn to a nonelected system, there being no allowable generic or

linking claim.

Response to Arguments

Applicant's arguments, see pgs 1-2, with respect to restriction have been fully

considered but are not persuasive.

In re pg. 1, applicant argues

> In response to the Restriction Requirement, Applicants assert that the search
> and examination of all of the claims can be made without serious burden to the
> Examiner, therefore, the Examiner should examine all the claims on the merits even if
> the application includes claims to two independent or distinct inventions. See MPEP §
> 803.

In response, the Examiner disagrees.

Such argument is merely a conclusory statement. The Examiner already

established the burden in restriction requirement of 9-29-2009. The applicant submitted

that claims 21-23 are *substantially different* from claims 1-20 (See pg. 9 of the remark

submitted on 7-14-2009).

In re pg. 1, applicant argues

> In addition, the Examiner conceded to examining all the pending claims rather
> than restrict the claims because the Restriction Requirement could have been issued
> at an earlier stage of prosecution but the Examiner decided to forgo doing so. It is
> inappropriate for the Examiner to issue a Restriction Requirement at this late stage of
> prosecution.

In response, the Examiner disagrees.

37 CFR 1.142 . Requirement for restriction.

(a)   If two or more independent and distinct inventions are claimed in a single application, the
       examiner in an Office action will require the applicant in the reply to that action to elect an
invention to which the claims will be restricted, this official action being called a requirement for restriction
       (also known as a requirement for division). Such requirement will normally be made before any
action on the merits; **however, it may be made at any time before final action**.
(b)   Claims to the invention or inventions not elected, if not canceled, are nevertheless
       withdrawn from further consideration by the examiner by the election, subject however to
       reinstatement in the event the requirement for restriction is withdrawn or overruled.

According to 37 CFR 1.142, restriction may be made any time before final. In instant case, the restriction requirement of 9-29-2009 was made before final action. Therefore, such restriction is proper.

Regarding "could have been issued at an earlier stage" argument", the applicant is reminded that claims 1 and 21 have been amended in the reply of 7-14-2009. In office action of 4/20/2009, the Examiner objected claims 21-23 under CFR 1.75 for substantial duplicate of claim 1-20. However, the applicant submits that claim 21-23 are not a duplicate of, but rather substantially different from claims 1-20 (See pg. 9 of the remark submitted on 7-14-2009). The Examiner then issued a restriction requirement at 9-29-2009. The restriction requirement could *not* have been issued earlier because it *was necessitated by the amendment* filed 7-14-2009. Therefore, the restriction was timely and proper.

Specification

The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required:

Claim 1 has been amended to recite "wherein each design in the population is programmed in a *programmable device*". While the spec does mention "*programmable hardware*" in [0017], nowhere does it provide antecedent basis for "programmable device".

Note: A device could be hardware or software (See pg. 297 of IEEE dictionary)

under broadest reasonable interpretation.

The applicant is encouraged to use claim term that is consistent with the spec.

For the purpose of compact prosecution, the Examiner presumes "programmable

device" is the same as "programmable hardware".

Should the applicant disagrees, the applicant should explain what

"programmable device" intends to mean and provide proper antecedent basis from the

spec.

Claim Rejections - 35 USC § 101

Applicant's arguments, see pg. 9, filed 7-14-2009, with respect to 101 rejection

have been fully considered. The rejection of claims 1-23 have been withdrawn in view

of presumption that "programmable device" is hardware.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-20 are rejected under 35 U.S.C. 112, first paragraph, as failing to

comply with the written description requirement. The claim(s) contains subject

matter which was not described in the specification in such a way as to

reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claim 1 has been amended to recite

"selecting for replacement at least one design as a function of the associated fitness level _and_ in response to a result signal of the new design being within a selected range of result signals from the consensus result;".

There is no support for such limitation. Applicant did not recite where support can be found in the spec for the amended limitation. Applicant should specifically point out the support for any amendments made to the disclosure. See MPEP 2163.06 and 714.02.

It is best understood by the Examiner that the invention is about selecting design that is out of a particular range from the consensus result for replacement. See spec [0026].

However, nowhere in the spec recites or even suggests select design for replacement has to do with "new design being within a selected range of result signals from the consensus result"

Furthermore, it is not inherent or implicitly or explicitly implied to one skilled in the art that selecting design for replacement is based on whether _new design_ being within a selected range of result signals from the consensus result or not. The fitness of new design simply has nothing to do with selection process.

Since the applicant did not recite where support can be found in the spec for the amended limitation, and the evidence (both spec and originally filed claim) found by the Examiner suggests otherwise, it is rejected under 112 1 for new matter.

In order to expedite the prosecution, the Applicant should specifically point out

the support for any amendments made to the disclosure. See MPEP 2163.06 and

714.02.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly
> claiming the subject matter which the applicant regards as his invention.

Claims 1-20 are rejected under 35 U.S.C. 112, second paragraph, as being

indefinite for failing to particularly point out and distinctly claim the subject

matter which applicant regards as the invention.

Claim 1 has been amended to recite

"selecting for replacement at least one design as a function of the associated fitness level *and* in

response to a result signal of the new design being within a selected range of result signals from the

consensus result;".

1) See the 112.1 above that such limitation is unsupported.

2) It is best understood by the Examiner that the invention is about selecting

design that is out of a particular range from the consensus result for replacement. See

spec [0026]. However, nowhere in the spec does the applicant recite or suggest select

design for replacement has to do with "new design being within a selected range of

result signals from the consensus result". Furthermore, one skilled in the art would *not*

select design for replacement based on whether *new design* being within a selected

range of result signals from the consensus result or not. The fitness of new design

simply has nothing to do with selection process. Therefore, the Examiner contends that

applicant has failed to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

3) Furthermore, It is unclear how the claim should be construed. What does the phrase "and in response...result" tide/refer to? Is it part of the selecting step? Or a new step? If it is part of the selecting step, what does "new design" in the phrase has to do with "selecting for replacement"? If it is a new step, what action does the phrase perform? It appears that the phrase only recites intended result, not an active step. Therefore, the Examiner contends that the claimed limitation above is unclear and indefinite.

4) Should the applicant disagrees, the applicant can point out why the selection for replacement has to do with new design, and provide specific supports in the spec, or amending the claim to make it more clear what the invention is.

5) For the purpose of compact prosecution, the above claimed limitation is interpreted as selecting design that is out of a particular range from the consensus result for replacement in view of spec [0026].

6) Any claim not specifically addressed, above, is being rejected as incorporating the deficiencies of a claim upon which it depends.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-2, 5-20, 25, 27-33 are rejected under 35 U.S.C. 102(b) as being anticipated by Sverre Vigander ("Evolutionary Fault Repair of Electronics in Space Applications" University of Sussex, Feb 2001). Examiner Notes (EN) and related citations are denoted in parenthesis.

In general, Sverre teaches using genetic algorithm in the field of fault tolerance in space electronics. See e.g. abstract and contents. Sverre specifically teaches conventional voting system and evolutionary voting system as means for fault repair. See e.g. section 6, 6.1 and 6.2. Sverre presents 3 different experiments being conducted to examine the subject, of which experiment 2 is most relevant. See e.g. section 7.2 and Fig. 7.3.

Specific details are mapped and explained below:

Claim 1 (currently amended): Sverrre anticipates a method for operating a system having a population of designs, each design being adaptable for use in operating the system (See e.g. Introduction on fault tolerant system using GA and FPGAs), the method comprising:

in response to an input signal, for each design in the population, generating an associated result signal (See e.g. pg. Fig 6.1 on each designs (i.e. circuits), inputs n and outputs m);

wherein each design in the population is programmed in a programmable device (See e.g. pg. Introduction 2nd paragraph that each circuit is programmed in FPGA. See also Fig 6.1, section 7.1.2 on FPGA);

determining a consensus result as a function of at least two of the generated

result signals (EN: ¶2 applies. "consensus" not further defined, interpreted as general

agreement among a group of design. See e.g. Fig 6.1 on majority voting of the *m*

results by a voting evaluation system. See also section 6.1 that the "consensus" is

based on majority output. EN: Furthermore, majority voting scheme is described in

applicant's own spec [0019] and [0025] as an approach for determining consensus

result.);

generating an output from the consensus result for operating the system (See

e.g. Fig. 6.1 on the control signals outputted from the voting. See also section 6.1 that

the voting element will select as a system output the value that a majority of the circuits

agree on);

determining an associated fitness level of each design as a function of the

associated result signal and the consensus result (EN: ¶2 applies. "fitness level" not

further defined. The Examiner interprets faulty circuit as unfit (i.e. low fitness level) and

the majority as fit (i.e. high fitness level). Furthermore, such interpretation is in accord

with applicant's spec [0019]. See e.g. Fig 6.1 on voting evaluation that it can shut down

a module if it disagrees with the majority.   See also section 6.1);

evolving a new design from at least one design in the population (See e.g. pg.

Fig 6.2 on evolving failed units. See also section 7.1.7 "elitism" on cloning new design

from fittest individual);

evaluating the new design for consistency with the consensus result (See e.g.

section 7.1.7 "elitism". EN: Since elitism always clones the fittest individuals (i.e. the

majority), the cloned design must be consistent with the consensus result (i.e. the

majority));

selecting for replacement at least one design as a function of the associated

fitness level and in response to a result signal of the new design being within a selected

range of result signals from the consensus result;" (See 112 rejection above and claim

interpretation. See e.g. section 6.2 on selecting the failed unit (i.e. disagreed with

majority) for replacement. See also e.g. pg. 29 on evolving the faulty FPGA); and

replacing the design selected for replacement with the ~~selected~~ new design (See

e.g. section 6.2 on evolving faulty unit. See e.g. section 7.1.7 "elitism" that fittest

design(s) are always cloned. EN: since the population size must remains the same, the

fittest design is always cloned, and the faulty unit is always shut down or repaired, it

implies that the faulty unit must be "replaced" by the clone. Otherwise, the population

size would not be the same and violates the experiment setting. See section 7.1.8);

Claim 2: See e.g. Fig. 6.1 on weighting (EN: each circuits gets an equal weight

in simple majority voting scheme).

Claim 5: Note that the determining a consensus result includes accumulating

result signals from each of the designs over a period of time (See e.g. section 6.1 on re-

evaluating a chip before evolution is applied. EN: this implied the output signals are

accumulated at least once).

Claim 6: Note that the determining a consensus result includes determining a

statistical result of the at least two of the generated result signals (See e.g. Fig 6.1 on

voting evaluation. See also section 6.1. EN: majority voting is a "statistical" result (i.e.

the mode)).

Claim 7: Note that the consensus result is outputted (See e.g. Fig 6.1 on

"correct outputs").

Claim 8: Note that the method further comprising selecting at least one of the

designs to generate an output for use in operating the system (See e.g. Fig 6. EN: the

"correct outputs" must be selected from "at least one" of the circuits).

Claim 9: Note that the determining includes comparing the associated result

signal with the consensus result (See e.g. section 6.1 on majority voting. EN: each

circuit's output is compared with the consensus (i.e. majority) in majority voting).

Claim 10: Note that the fitness level of each design includes determining the

associated fitness level as a function of first and second differences, the first difference

being a difference between the associated result signal of the design and the

consensus result, the second difference being a difference between the associated

result signals of the other designs and the consensus result (See e.g. section 6.1 on

majority voting. EN: each circuit's output is compared with the consensus (i.e. majority)

in majority voting, and the one disagrees with the others (i.e. majority) is assigned "low"

fitness (i.e. being a faulty circuit)).

Claim 11: Note that the fitness level is determined by a bitwise difference of the

signals (EN: it is inherent because all data are represented as bits/byte in computer.

Hence, the comparisons are "bitwise").

Claim 12: Note that selecting for replacement at least one design comprises selecting a design having the greatest difference between the associated result signal of the design and the consensus result (See e.g. section 6.1 on majority voting. EN: faulty circuit is the one with the greatest difference between the consensus (i.e. disagree most with the majority)).

Claim 13: Note that selecting for replacement the at least one design is a output difference between the signal and the consensus (See e.g. section 6.1 and Fig 6.1 on majority voting. EN: The faulty circuit is the one being replaced (i.e. the module being shut down by control signals)).

Claim 14: Note that selecting for replacement the at least one design comprises randomly selecting at least one design (See e.g. section 7.1.7 on equal probability of being as "the elite". EN: equal probability = random. See definition from answers.com).

Claim 15: Note that selecting at least one design comprises using the associated fitness as a bias to increases a probability of selecting each design (See e.g. section 7.1.7 on "to lessen the chance of being caught in local optima").

Claim 16: Note that the fitness evaluation includes weighting the design as a function of degree of agreement between the signal and the consensus (See e.g. section 6.1 on majority voting. EN: each circuit's output is compared with the consensus (i.e. majority) in majority voting, and the one disagrees with the others (i.e. majority) is assigned "low" fitness (i.e. being a faulty circuit)).

Claim 17: Note that prior to generating an associated result signal, further comprising: evolving a preliminary population of designs by determining an associated

fitness level of each design in the preliminary population as a function of fixed

evaluation criteria; and in response to satisfaction of selected completion criteria,

ceasing evolving the preliminary population of designs and storing the preliminary

population of designs as said population of designs from which the associated result

signals are generated (See e.g. Section 7 on experiment setup and initialization).

Claim 18: note that each of the steps of the method are performed subsequent

to an occurrence of at least one of: reaching a selected time; reaching an end of a

predetermined time interval; and a triggering event (See e.g. Fig. 7.3 and Experiment 2

that each run is done with a different, random stuck-at fault (i.e. "triggering event")).

Claim 19: note that the triggering event is a failure of the system (See e.g. Fig.

7.3 and Experiment 2 that the triggering event is a random stuck-at fault).

Claim 20: note that the generating the associated result signal for each design in

the population comprises: programming a programmable device with a first design of

the population of designs (See e.g. section 7 on experiment setup); reprogramming the

programmable device with a second design of the population of designs (See e.g. Fig.

7.3, and experiment 2.1) ; and generating an associated result signal by generating an

associated result signal using the second design (See e.g. Fig. 7.3, and experiment 2.1

on the result obtained for the voting system with imperfect FPGAs).

Claim 25: Sverrre anticipates a system comprising: a programmable device

programmable with at least one of a plurality of designs (See e.g. Fig. 71 on FPGA),

each design being adapted to generate an associated result signal in response to an

input signal (See e.g. Fig. 71 on FPGA); a fitness evaluator to determine a consensus

result as a function of associated result signals from at least two of the plurality of

designs and to determine an associated fitness level of each design of the plurality as a

function of the associated result signals and the consensus result (See e.g. Fig. 6 on

voter); and a selector to select and replace one of the plurality of designs with a new

design as a function of the associated fitness level of the selected design (See e.g. Fig.

6 on Voter. See also section 6.2 that the voting system selects a faulty FPGA for

evolution).

Claim 27: The system of claim 25, wherein the fitness evaluator selects at least

one of the plurality of designs for implementation in an operational device as a function

of the associated fitness levels of the plurality of designs (See e.g. section 7.1.5 on

selection method. EN: the selected designs are based on the rank (i.e. fitness)).

Claim 28: The system of claim 25, wherein the fitness evaluator determines an

associated fitness level of a design exhibiting a fault, the associated fitness level being

indicative of the fault, and wherein the selector selects and replaces the design

exhibiting the fault as a function of said design's associated fitness level (See e.g.

section 6.2. EN: the voter selects a faulty unit (i.e. disagrees with the majority) to

undergo evolution process).

Claim 29: The system of claim 25, further comprising: a program controller to

sequentially program the programmable device with one design at a time, the input

signal being sequentially applied to single designs to generate the associated result

signals (See e.g. Fig. 8.6. EN: since the fitness of each individual FPGA is obtained,

the input signals must have been applied to each FPGA one at a time (i.e.

"sequentially") In other words, unless the results are reported simultaneously, it is being

"sequentially").

Claim 30: The system of claim 25, wherein the programmable device includes a

programmable logic device (See e.g. Fig. 7.1 on FPGA).

Claim 31: The system of claim 25, wherein the programmable device includes a

microprocessor (See e.g. Fig. 7.1 on FPGA. EN: FPGA is a "microprocessor" because

it process inputs and generates outputs based on the inputs).

Claim 32: The system of claim 25, wherein the programmable device includes at

least one of the fitness evaluator and the selector (See e.g. Fig. 6.1 on

"selector"/"evaluator" (i.e. the voter)).

Claim 33: The system of claim 25, further comprising a memory for storing at

least one of the plurality of designs (See e.g. Fig 7.1. EN: each FPGA has a "memory").

Response to Arguments

Applicant's arguments filed 7/14/2009 have been fully considered but they are

not persuasive.

In re pg. 10, applicant argues

> Applicant respectfully submits that Vigander's use of "elitism" does not
> correspond to the claimed "determining a consensus result as a function of at least two
> of the generated result signals; ...evaluating the new design for consistency with the
> consensus result; [and] selecting for replacement at least one design as a function of
> the associated fitness level and in response to a result signal of the new design being
> within a selected range of result signals from the consensus result" as recited in claim
> 1.

In response, the Examiner disagrees. See the 112.1 and 112.2 rejection above that such claim is not supported and is indefinite. See also the rejection above that Sverre does teach the claim as interpreted by the Examiner.

In re pg. 10, applicant argues

Vigander describes the use of "elitism" as "the fittest individual was always cloned." (7.1.7). Vigander further describes the "fitness value" as being a "measurement of how good an individual is." (Appendix C). Fitness is measured with a "fitness function," which according to Vigander evaluates "how well an individual performs in the application." (Appendix C).

In response, the Examiner disagrees.

1) Appendix C is merely a glossary of terms. It is not the section that the Examiner used to reject the claim.

2) See the rejection above on relevant section of Sverre that does teach the claim limitation as interpreted by the Examiner.

In re pg. 10, applicant argues

Vigander does not disclose the fitness function as being determined based on a "consensus result" as recited in claim 1. Nor does Vigander disclose replacing a design "in response to a result signal of the new design being within a selected range of result signals from the consensus result" as recited in claim 1.

In response, the Examiner disagrees.

1) See the rejection above that "fitness level" and "consensus result" are not further defined.

2) See the rejection above on relevant section of Sverre that does teach the claim limitation as interpreted by the Examiner.

In re pgs. 10-11, applicant argues

> The Examiner asserted that "since the majority vote is based on fittest of individual [sic], Elitism means the evolved design must product [sic] response within range of consensus result." (OA 4-20-09). Applicant does not understand the Examiner's explanation as related to the limitations of claim 1 and the teachings of Vigander. Applicant's claim 1 does not determine a majority vote based on the fittest

> individuals in the population. Rather, claim 1 determines the consensus result as a function of at least two of the result signals generated from associated designs in the population. Thus, Applicant's claim 1 does not look to the fittest individuals in determining the consensus results.

In response, the Examiner disagrees.

1) See the rejection above. The Examiner attempted to rephrase the language and made it clear how and why Sverre teaches the claimed limitation.

2) Regarding "applicant's claim 1 does not determine a majority vote based on the fittest individuals in the population" argument. The Examiner disagrees.

While the claim only recites "consensus result", not "majority voting". The applicant is remind that "consensus result" are not further defined. Furthermore, claims are not interpret in vacuum. The Examiner interprets the claim in view of spec [0019] and [0025]. It is applicant's own spec that submits consensus result can be determined

by majority voting. Therefore, Sverre does teach determining consensus result even

though the word "majority voting" is not claimed.

3) regarding "claim 1 does not look to the fittest individuals in determining the

consensus result" argument. Nowhere in Sverre mentions consensus result are

determined by "fittest individual". As section 6.1 and 6.2 made clear, the consensus is

determined by the output by the majority.

In re pg. 11, applicant argues

As to Vigander, there is no apparent indication that Vigander considers a
majority vote in determining fitness level of an individual. Rather Vigander teaches "the
fitness of an individual is evaluated by testing all input combinations (2^8 = 256), and
checking whether the result is correct. A fitness value is assigned as the number of
correct minterms, or specific input combinations." (7.1.4). Thus, Vigander's fitness
function knows "whether the result is correct" for each individual for all combinations of
inputs and has no need for majority voting in determining fitness.

In response, the Examiner disagrees.

1) See the rejection above. As section 6.1 and 6.2 made clear, the consensus is

determined by the output by the majority. Any design disagrees with the majority is

considered as faulty, therefore low fitness.

2) "fitness value" does not necessary equals to "fitness level". See the rejection

above that "fitness level" is not further defined, and is being mapped to the agreement

of the design, not "fitness value".

3) The Examiner would like to draw applicant's attention on pg. 22 last paragraph

that Sverre teaches "a set of faulty circuits could <u>vote</u> and always get the right answer

together" and pg. 29 and Fig. 8.6 on "the dashed line are the individual FPGA's

performance, the sold line is the <u>voting system'</u>s" Therefore, Sverre's system <u>does </u>vote

even if it has an explicit fitness function defined.

In re pg. 11, applicant argues

> For the reasons set forth above, Applicant respectfully submits that the
> Examiner's premise ("since the majority vote is based on fittest of individual [sic]") is
> not supported by any of Applicant's claim, specification, or Vigander's teachings.
> Applicant further submits that the Examiner's conclusion ("Elitism means the evolved
> design must product [sic] response within range of consensus result.") does not follow
> from the Examiner's premise and is also neither taught nor suggested by Vigander.

In response, the Examiner disagrees.

1) See the rejection and response above that the claims are rejected in view of

the spec [0019] and [0025], not in vacuum.

 2) If applicant's argument is true, that means the evolved design <u>must not</u>

produce response within range of consensus result. How is that possible? Sverre

teaches designs that disagreed with majority as faulty (therefore unfit). Hence, the

majority are considered as fit. Since the elitism always clone the "fitness" individual

(those of the majority), how can the cloned design outside the range of the consensus

(majority)?

In re pg. 11, applicant argues

If the Examiner's note has been misconstrued, Applicant respectfully requests an explanation that shows how Vigander's use of "elitism" is equivalent to the claimed use of the consensus result, both for determining fitness levels of each design in the population and for evaluating the new design for consistency with the consensus result.

In response

1) "elitism" is not use to determine consensus result. See the rejection above. The consensus result is determined by the voting of each design.

2) "elitism" is not used to determine fitness level of each design either. See the rejection above. The fitness level is determined by the voting. The majority is the fit one while the minority is the unfit one.

2) "elitism" is related to the evaluation for consistency. See the rejection above. Elitism is used to reproduce design that represent the fittest individual (i.e. majority), the cloned design must produce same signals as its parent (i.e. one of the majority). Therefore, the cloned design is inherently evaluated to produce results that is consistent with the consensus result.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148

USPQ 459 (1966), that are applied for establishing a background for determining

obviousness under 35 U.S.C. 103(a) are summarized as follows:

1.   Determining the scope and contents of the prior art.
2.   Ascertaining the differences between the prior art and the claims at issue.
3.   Resolving the level of ordinary skill in the pertinent art.
4.   Considering objective evidence present in the application indicating
      obviousness or nonobviousness.

Claims 3-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Sverre Vigander ("Evolutionary Fault Repair of Electronics in Space Applications"

University of Sussex, Feb 2001), in view of Xin Yao ("Making Use of Population

Information in Evolutionary Arftifical Neural Networks" IEEE 1998).

Claim 3: Sverre teaches a simple voting scheme which weights each individual

equally. Sverre fails to teach weighting individual as a function of fitness level

determined in a prior generation. In other words, Sverre fails to teach giving more

weight to someone that is more "reliable" based on their fitness obtained in a prior

generation. However, such idea is nothing more than a weighted voting scheme, in

which the weight is not equally distributed. The weight in weighted voting scheme is

dynamic, which means a more reliable individual gets more weights than a less reliable

one. And, reliability usually determines based on fitness, rank, error measures...etc.

Xin teaches the idea of weighted voting (See e.g. IV-B, rank based linear combination),

which uses the fitness information to compute a weight for each individual. Xin also

teaches the simple majority voting and explained the deficiency of simple voting (See

e.g. IV-A). Xin also explained because not all individual are equally important, a

weighted voting scheme should be better because it takes into accounts the difference among individuals (See e.g. IV-A and B). One of ordinary skill in the art would/could have been motivated to modify Sverre's simple voter in view of Xin's teaching with predictable result of weighting individual as a function of fitness level determined in a prior generation. It is merely applying a known technique to a known device (method, or product) ready for improvement to yield predictable results. See MPEP 2141 III D.

Claim 4: The combinations of Sevrre and Xin (refer herein as SX) teach weighting individual as a function of fitness level determined in a prior generation (See claim 3 above). However, SX does not teach weighting individual as a function of number of generations in which the associated design has been a member of the population. In other words, SX does not teach giving more weight to a "senior". However, it would have been obvious to one skill in the art that giving more weight to fitter individual is analogous to giving more weight to senior individual. A fitter individual usually performs better and thus should be given more weight; the same applies to a "senior" individual. Hence, one of ordinary skill in the art would/could have been motivated to modify SX teaching with predictable result of weighting individual as a function of "seniority" rather than "fitness level". It is merely a simple substitution of one known element for another to obtain predictable results. See MPEP 2141 III B.

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Response to Arguments

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Applicant's arguments filed 7/14/2009 have been fully considered but they are not persuasive.

In re pg. 12, applicant argues

> Claims 3-4 are understood to be patentable under 35 USC §103(a) over
> Vigander in view of "Yao" (Making Use of Population Information in Evolutionary
> Artificial Neural Networks, IEEE 1998) to Yao. The rejection is respectfully traversed
> because the Office Action does not show that all the limitations are suggested by the
> combination and does not provide a proper motivation for modifying the teachings of
> Vigander with teachings of Yao.
>
> Claims 3-4 depend from claim 1, and Yao neither teaches nor suggests those
> limitations of claim 1 which Vigander does not teach, as explained above. Therefore,
> the Office Action has not shown that the Vigander-Yao combination suggests all the
> limitations of claims 3-4 . The rejection of claims 3-4 should be withdrawn because a
> *prima facie* case of obviousness has not been established.

In response, the Examiner disagrees. See the rejection above that Sverre does
teach all the claimed limitations.

Examiner Note (EN):

¶ 2: Applicant fails to define or further define the term(s). Hence, the Examiner has full
latitude to interpret each claim in the broadest reasonable sense.

Pertinent prior art

The prior art made of record and not relied upon is considered pertinent to
applicant's disclosure.

Shanthi et al ("GA based on-line testing and recovery for critical digital systems"
2002) teaches fault tolerant circuit that uses majority voting. See abstract and Fig.1 in
particular.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LUT WONG whose telephone number is (571)270-1123. The examiner can normally be reached on M-F 7:30-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Donald Sparks can be reached on (571) 272-4201. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the

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system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Lut Wong/
Examiner, Art Unit 2129

/David R Vincent/
Primary Examiner, Art Unit 2129